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UNIDIRECTIONAL CARBON/CARBON FOR ION ENGINE OPTICS

Conventional ion engine optical grids are made from hydroformed molybdenum. Carbon/carbon has been utilized in place of molybdenum because of its lower sputter yield, which contributes a greatly increased engine life, and its low CTE, which allows more efficient engine operation. The requirements for this material are that it must have very high stiffness, very tight dimensional tolerances, and be optimized for an hexagonal hole pattern with a very high open area fraction. The carbon/carbon for this application was fabricated from unidirectional tape prepreg, using pitch fiber, and was processed to very high temperature. The use of unidirectional tape allowed for a sufficient number of plies to be used to generate a balanced three directional layup within the thickness constraints of the material, as well as providing increased strength and stiffness over that normally seen with fabric based carbon/carbon.